UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

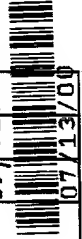|	
Attorney Docket No.	35.C11725 DI
First Named Inventor or Application Identifier	
YUMIKO HIDAKA ET AL.	
Express Mail Label No.	

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO:
Commissioner for Patents
Box Patent Application
Washington, DC 20231

1. [X] **Fee Transmittal Form**
(Submit an original, and a duplicate for fee processing)

2. [X] Specification — *Total Pages* [43]

3. [X] Drawing(s) *(35 USC 113)* — *Total Sheets* [14]

4. [X] Oath or Declaration — *Total Pages* [2]

   a. [ ] Newly executed (original or copy)

   b. [ ] Unexecuted for information purposes

   c. [X] Copy from a prior application (37 CFR 1.63(d))
(for continuation/divisional with Box 17 completed)
[Note Box 5 below]

     i. [ ] **DELETION OF INVENTOR(S)**
Signed Statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1 33(b)

5. [ ] Incorporation By Reference *(useable if Box 4c is checked)*
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4c, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

6. [ ] Microfiche Computer Program *(Appendix)*

7. Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all necessary)*

   a. [ ] Computer Readable Copy

   b. [ ] Paper Copy (identical to computer copy)

   c. [ ] Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. [ ] Assignment Papers (cover sheet & document(s))

9. [ ] 37 CFR 3 73(b) Statement *(when there is an assignee)*   [ ] Power of Attorney

10. [ ] English Translation Document *(if applicable)*

11. [X] Information Disclosure Statement (IDS)/PTO-1449   [ ] Copies of IDS Citations

12. [X] Preliminary Amendment

13. [X] Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*

14. [ ] Small Entity Statement(s)   [ ] Statement filed in prior application Status still proper and desired

15. [ ] Certified Copy of Priority Document(s) *(if foreign priority is claimed)*

16. [ ] Other: _____

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17. If a CONTINUING APPLICATION, *check appropriate box and supply the requisite information:*

[ ] Continuation   [X] Divisional   [ ] Continuation-in-part (CIP) of prior application No. 08/724,481

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18. CORRESPONDENCE ADDRESS

[X] Customer Number or Bar Code Label

05514
(Insert Customer No. or Attach bar code label here)
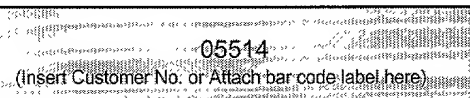
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CLAIMS	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALCULATIONS
	TOTAL CLAIMS (37 CFR 1.16(c))	11-20 =	0	X $ 18.00 =	$0
	INDEPENDENT CLAIMS (37 CFR 1.16(b))	6-3 =	3	X $ 78.00 =	$234.00
	MULTIPLE DEPENDENT CLAIMS (if applicable) (37 CFR 1 16(d))			$260.00 =	$0
				BASIC FEE (37 CFR 1.16(a))	$690.00
				Total of above Calculations =	$924.00
	Reduction by 50% for filing by small entity (Note 37 CFR 1.9, 1.27, 1.28).				
				TOTAL =	$924.00

19. Small entity status

a. ☐ A Small entity statement is enclosed

b. ☐ A small entity statement was filed in the prior nonprovisional application and such status is still proper and desired.

c. ☐ Is no longer claimed.

20. ☒ A check in the amount of $ __924.00__ to cover the filing fee is enclosed.

21. ☐ A check in the amount of $ _____ to cover the recordal fee is enclosed.

22. The Commissioner is hereby authorized to credit overpayments or charge the following fees to Deposit Account No. 06-1205:

a. ☒ Fees required under 37 CFR 1.16.

b. ☒ Fees required under 37 CFR 1.17.

c. ☐ Fees required under 37 CFR 1.18.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED	
NAME	Jack M. Arnold
SIGNATURE	*Jack M. Arnold Reg. No. 25,823*
DATE	July 12, 2000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)
                                 : Examiner: L. Sealey
YUMIKO HIDAKA ET AL.   )
      Divisional of   : Group Art Unit: 2772
Application No.: 08/724,481   )
      filed October 1, 1996   :
Filed: Herewith   )
                                 :
For: AN IMAGE PROCESSING   )
      APPARATUS AND METHOD   : July 12, 2000

Commissioner for Patents
Washington, D.C.   20231

PRELIMINARY AMENDMENT

Sir:

        Preliminary to examination, please amend the above-

identified application as follows:

IN THE SPECIFICATION:

Page 1

    line 8, after "years," insert --it has become known

that-- and after "problems" insert --exist--;

    line 10, change "of every" to --for each--;

    line 11, after "used" insert --.-- and delete "because

of";

    line 12, before "a spread" insert --This is due to--;

line 14, change "every" to --for each-- and delete "have been pointed out";

line 15, after "(CMS)" insert --, which is known--;

line 17, after "process" insert --is executed--; and

line 21, delete "is executed".

Page 2

line 7, change "Fig. 7" to --Fig. 13--.

Page 3

line 26, change "Fig. 7" to --Fig. 14--.

Page 4

line 1, change "10" to --510--;

line 3, change "12" to --512--;

line 4, change "10" to --510--;

line 6, change "14" to --514--;

line 8, change "10" to --510--;

line 9, change "16" to --516--;

line 10, change "12" to --512--;

line 12, change "18" to --518--;

line 15, change "22" to --522--;

line 17, change "24" to --524--;

line 18, change "20" to --520--;

line 20, change "16" to --516--;

line 22, change "24" (both occurrences) to

--524--; and after "supplies" insert --the output signal--;

line 24, change "Fig. 8" to --Fig. 15--;

line 25, after "matter" insert --(original) 530--; and

change "10" to --510--;

line 26, after "(original image)" insert --532--; and

line 27, change "24" to --524--.

Page 5

line 2, after "light" insert --534--;

line 3, change "18" to --518--; and change "24" to

--524-- and delete "30";

line 5, after "light" insert --534--;

line 6, after "image" insert --532--;

line 7, change "24" to --524--; and change "to" (second

occurrence) to --on--;

line 8, after "screen)" insert --536--;

line 9, after "color" insert --536--;

line 10, after "image" insert --532--;

line 11, after "image" insert --532--;

line 12, after "light" insert --534--;

line 14, after "light"(first occurrence) insert

--534--;

line 15, change "18" to --518--;

line 16, change "16" to --516--;

line 17, change "12" to --512--;

line 19, after "image" insert --532--; and

line 20, change "24" to --524--.

Page 7

line 2, change "8" to --15--;

line 3, after "image" insert --532--;

line 4, change "24" to --524-- and after "image" insert --532--;

line 5, after "color)" insert --536--;

line 6, delete "the"; and

line 7, change "has been" to --is--.

Page 8

line 7, after "made" insert --to--.

Page 9

line 2, delete "the";

line 5, delete "the";

line 7, delete "the";

line 10, delete "the";

line 13, delete "the";

line 15, delete "the"; and

line 17, delete "the".

Page 10

line 5, change "a" to --the--;

line 15, delete "The" and change "embodiment" to

--Embodiment--;

line 23, after "different" insert --for--; and

line 26, delete "the".

Page 11

line 12, change "the" to --an--;

line 18, change "into" to --to--; and

line 19, after "certain" insert --known-- and delete

"has already been known".

Page 12

line 9, delete "a";

line 14, delete "a" and "into"; and

line 25, delete "the".

Page 13

line 1, after "whether" insert --or not--;

line 2, delete "or not"; and

line 19, change "be also" to --also be--.

Page 15

line 5, change "be also" to --also be--;

line 14, change "an" to --a--;

line 16, change "an" to --a--;

line 18, delete "the"; and

line 21, delete "the".

Page 16

line 3, change "will of" to --a choice by--;

line 9, change "205" to --210--;

line 17, delete "the"; and

line 19, delete "the".

Page 17

line 13, delete "the"; and

line 25, change "be also" to --also be--.

Page 18

line 9, change "be also" to --also be--;

line 11, after "and" insert --a--;

line 14, change "be also" to --also be--;

line 15, change "into" to --in the--; and

line 25, delete "the".

Page 19

line 10, delete "the";

line 15, after "Whether" insert --or not--;

and after "satisfactory" delete "or not"; and

line 17, change "satisfies" to --is satisfied with--.

Page 20

line 21, change "be also" to --also be--.

Page 21

line 2, delete "The" and change "embodiment" to

--Embodiment--; and

line 17, delete "the".

Page 22

line 23, before "to" insert --the output signal--.

Page 23

line 16, after "onto" insert --a--;

line 17, after "supplies" insert --the output signal--.

Page 24

line 20, after "supplies" insert --them--.

Page 25

line 12, change "relations" to --relation--.

Page 30

line 8, change "are" to --is--;

line 10, delete "it"; and

line 20, change "be also" to --also be--.

Page 31

line 4, delete "it".

Page 32

line 19, after "whether" insert --or not--; and

line 20, after "performed" delete --or not--.

Page 35

line 23, change "be also" to --also be--.

Page 37

line 16, change "but" to--, and--.

IN THE CLAIMS:

Please cancel Claims 1-11 without prejudice and without disclaimer of subject matter.

Please add Claims 12-22 as follows:

--12. An image processing apparatus comprising:

input means for inputting input image data from a source device having a function for adjusting an image processing condition on a basis of an instruction of a user;

converting means for converting the input image data to device independent image data by using a profile of the source device; and

setting means for setting a standard condition corresponding to the profile as an image processing condition of said source device.

13. An apparatus according to claim 12, wherein the standard condition is stored in the profile.

14. An apparatus according to claim 12, wherein said source device holds said standard condition.

15. An apparatus according to claim 12, wherein the standard condition corresponds to a condition used when the profile is prepared.

16. An apparatus according to claim 12, wherein said source device is a display device, and wherein the image processing condition includes any one of conditions relating to gamma characteristic, contrast, brightness, color and temperature.

17. An apparatus according to claims 12, wherein said converting means performs a color matching process corresponding to said source device and an image output device, and wherein said converting means converts the device independent image data to image data for the image output device by using the profile of the image output device, and further comprising:

output means for outputting the image data for the image output device to the image output device; and

adjusting means for adjusting an image
processing condition of the image output device to a standard
condition corresponding to a profile of the image output
device.

18.   An image processing apparatus comprising:

converting means for converting input image
data by using an input profile of a source device and an
output profile of an image output device;

output means for outputting the converted
image data to the image output device having a function for
adjusting an image output condition on a basis of an
instruction of a user; and

setting means for setting a standard condition
corresponding to the output profile as an image output
condition of the image output device.

19. An image processing method comprising:

an input step of inputting input image data
from a source device having a function for adjusting an image
processing condition on a basis of an instruction of a user;

a converting step of converting the input
image data to device independent image data by using a
profile of the source device; and

a setting step of setting a standard condition corresponding to the profile as an image processing condition of said source device.

20. A recording medium to store programs to realize an image processing method, said method comprising:

an inputting step of inputting input image data from a source device having a function for adjusting an image processing condition on the basis of an instruction of a user;

a converting step of converting the input image data to device independent image data by using a profile of the source device; and

a setting step of setting a standard condition corresponding to the profile as an image processing condition of said source device.

21. An image processing method comprising:

a converting step of converting input image data by using an input profile of a source device and an output profile of an image output device;

an output step of outputting the converted image data to the image output device having a function for

adjusting an image output condition on the basis of an

instruction of a user; and

a setting step of setting a standard condition

corresponding to the output profile as an image output

condition of the image output device.

22.   A recording medium to store programs to

realize an image processing method, said method comprising:

a converting step of converting input image

data by using an input profile of a source device and an

output profile of an image output device;

an output step of outputting tho converted

image data to the image output device having a function for

adjusting an image output condition on the basis of an

instruction of a user; and

a setting step of setting a standard condition

corresponding to the output profile as an image output

condition of the image output device.--

<u>REMARKS</u>

Claims 12-22 are presented for examination, having

been added in place of Claims 1-11 which have been canceled

without prejudice or disclaimer of subject matter. Claims

12-22 correspond to non-elected Claims 21-31 in parent

application No. 08/724,481. The specification and abstract

have been amended as to formal matters as in parent

application No. 08/724,481. An Information Disclosure

Statement is submitted herewith.

Applicants respectfully request favorable

consideration and early passage to issue of the present

application.

Applicant's undersigned attorney may be reached in

our New York office by telephone at (212) 218-2100. All

correspondence should continue to be directed to our below

listed address.

Respectfully submitted,

Attorney for Applicants

Registration No. 25,823

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New York, New York 10112-3801
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NY_MAIN 95092 v 1

- 13 -

IMAGE PROCESSING APPARATUS AND METHOD

BACKGROUND OF THE INVENTION

Field of the Invention

5   The invention relates to image processing apparatus
and method for performing a color process.

Related Background Art

     In recent years, problems such that various color
reconstructions are performed due to a difference of a
10   coloring mechanism of every input/output device or a
difference of a coloring material to be used because of
a spread of networks and an enlargement of a demand for
a color product and that a color matching function
differs every kind of apparatus have been pointed out.
15   There is a color management system (CMS) as a technique
which is highlighted to solve those problems. At
present, to solve the problems, a process for matching
the colors of input and output images by connecting the
system to a computer and performing a data conversion
20   using profile data formed every input/output equipment
by using a software (CMS software) is executed.

     Even if the same signal is inputted, the same color
is not always outputted due to a difference of the
device. Therefore, information regarding
25   characteristics of input/output signals in input/output
equipment which was set in a reference state in order
to suppress the characteristics of each device has been

stored in the profile data. Input/output
characteristics of the signal of the device are
distinct by the profile data of each device and by
correcting by using the profile data, the colors can be

5   matched irrespective of the device.

The data conversion will now be described with
reference to Fig. 7. In the diagram, device
characteristics data regarding input equipment has been
stored in input equipment profile data 101. Device

10   characteristics data regarding output equipment has
been stored in output equipment profile data 107.

A color signal obtained from the input equipment is
converted by a data conversion unit 106 by using the
input equipment profile data 101. The converted data

15   is a color signal which doesn't depend in each device.
In further another data conversion unit 112, the data
is converted into a color signal suitable for each
output equipment by using the output equipment profile
data 107 and is outputted by using such a color signal.

20   At present, input/output equipment such as monitor,
printer, scanner, or the like which is most frequently
used has a function for changing the color or
brightness in accordance with a taste of the user. The
monitor generally has a knob to adjust the brightness

25   and contrast. To obtain a preferable image in
consideration of a fatigue of the eyes, the user can
adjust the brightness of the monitor by freely moving

the knob. In a monitor which can perform a further advanced correction, a formation of a gamma table, a change in color temperature of the monitor, and the like can be performed.

In a manner similar to the above, there is also a printer having the correcting function to obtain a desired color of the user by a method such that an output balance of colors is adjusted, an LUT is formed, or the like.

As mentioned above, when input/output equipment which can be adjusted by the user is used, there occurs a problem such that by the execution of the adjustment by the user, a state of the input/output equipment when the profile data is formed and a state of the equipment when data is actually inputted or outputted are different, so that an accurate color matching cannot be performed.

Such a problem also occurs in the color management system for performing a color matching process according to an illumination light, namely, a color managing technique which has been proposed in recent years.

A construction in the case where an image of an original is read by an image scanner and the read image is displayed on a monitor screen and an ambient light is considered will now be described. Fig. 7 shows a schematic constructional block diagram. An image

scanner 10 reads out the image of the original and outputs the read image data in an (R, G, B) form. A scanner color conversion device 12 converts an output signal of an RGB colorimetric system of the scanner 10

5   into a standard colorimetric system (XYZ colorimetric system) with reference to a scanner profile 14 which has previously been formed from image reading characteristics of the image scanner 10.

A signal conversion device 16 corrects an output of

10   the conversion device 12 in consideration of an ambient light in accordance with ambient color information which is supplied from the ambient light sensor 18 to detect color components or a color distribution of the ambient light.

15   In accordance with a monitor profile 22 which reflects coloring characteristics of a monitor display (hereinafter, abbreviated to a monitor) 24 to be used, a monitor color conversion device 20 converts the output signal of the XYZ colorimetric system of the

20   signal conversion device 16 into values of an RGB space in consideration of the coloring characteristics of the monitor 24 and supplies to the monitor 24.

An environment where the image is observed will now be simply explained with reference to Fig. 8. A

25   printed matter is read by the image scanner 10 and the read image is displayed as an image (original image) on the screen of the monitor 24. The illumination light

from a fluorescent light or the like illuminates an ambient portion as an ambient light. The ambient light sensor 18 is put onto the monitor 24, a printer 30, or a computer main body and detects a color distribution or color components of the ambient light. The original image is generally displayed on the screen of the monitor 24 so as to be overlaid to a background color (color of the screen). Therefore, the user simultaneously looks at both of the background color and the original image and recognizes the color of the original image.

The ambient light changes depending on a situation. According to the existing color managing technique, the ambient light is detected by the ambient light sensor 18 and, in accordance with the detection information, the signal conversion device 16 corrects an output of the scanner color conversion device 12, namely, the color signal of the standard colorimetric system. Thus, the coloring of the original image which is displayed on the screen of the monitor 24 is adjusted in accordance with the ambient light. Namely, a colorimetrological coincidence is realized.

Although the colors of the same value on the standard color space inherently ought to be seen as a same color, in the case where both colors are a color of the monitor (light source color) and a color of the printed matter (object color) and even if they have the

same value on the standard color space, they cannot be seen as a same color for the human eyes due to a difference of the visual environment, mode, or the like. As for such a problem, the following correcting techniques have also been proposed in order to enable the human being to perceive them as a same color by observing with the eyes.

It is considered that when observing colors, the human being uses white as a reference and recognizes all of the colors by comparing with white. It is now considered a case, as an example, of observing a monitor display image put under a certain ambient light and a printed matter put under the same or a different ambient light. There are a number of white colors which should be reference colors such as white of the monitor screen, white of the environmental light, white of a paper illuminated by the environmental light, and the like. It is possible to regard such that the colors are observed by using a white color adapted to such a number of white colors at a certain ratio as a reference. A method whereby by calculating reference white and converting the colors of all of the image by setting such white as a reference, observation colors are mutually matched is considered. Actually, when reference white is calculated, one adaptation ratio of white of the monitor screen under the fluorescent light to the ambient light is determined and reference white

is calculated by using such an adaptation ratio.

As shown in Fig. 8, when observing the original image which is displayed on the screen of the monitor 24, both of the original image and the ambient color (background color) simultaneously enter the eyes. Since the human being recognizes the color by a comparison with the circumstances, it has been known that if the colors displayed in the center portion are the same and the background colors are different, the colors of different impressions are perceived. Therefore, even in case of displaying the same image, if the background color differs, the color of the display image is recognized as a different color.

SUMMARY OF THE INVENTION

The invention is made in consideration of the above points and it is an object of the invention to realize a highly-accurate color matching.

Particularly, an object of the invention is to enable an effect of a preset color process to be most efficiently derived.

To accomplish the above object, according to the invention, there is provided an image processing apparatus comprising: setting means for manually setting a first color processing parameter; first color processing means for performing a first color process by using the first color processing parameter; storing

means for storing a second color processing parameter which has been set in correspondence to the first color processing parameter as a reference value; and second color processing means for performing a second color

5   process different from the first color process by using the second color processing parameter, wherein when the second color processing means is made function, the first color processing parameter is set to the reference value.

10   Another object of the invention is to provide a highly-accurate color matching on the basis of an application of the user.

To accomplish the above object, according to the invention, there is provided an image processing

15   apparatus having first and second color matching modes for performing different color matching processes, comprising: selecting means for selecting the color matching mode on the basis of an instruction of the user; and setting means for setting a background color

20   on a display screen to a predetermined color when the second color matching mode is selected by the selecting means.

The above and other objects and features of the present invention will become apparent from the

25   following detailed description and the appended claims with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram regarding an image processing apparatus according to the embodiment 1;

Fig. 2 is a flowchart for image processes according to the embodiment 1;

Fig. 3 is a constructional diagram of an image processing system according to the embodiment 2;

Fig. 4 is a block diagram showing an example of an image processing system according to a modification of the embodiment 1;

Fig. 5 is a block diagram showing an example of an image processing system according to a modification of the embodiment 1;

Fig. 6 is a flowchart for image processes according to the embodiment 2;

Fig. 7 is a schematic constructional block diagram of an image processing apparatus according to the embodiment 3;

Fig. 8 is a schematic diagram showing an arrangement of blocks in the embodiment shown in Fig. 7;

Fig. 9 is a schematic constructional block diagram in a signal conversion device 16;

Fig. 10 is a schematic diagram showing the relations among an ambient light, white and a background color of a monitor, and reference white;

Fig. 11 is a schematic constructional block diagram

of a modification;

Fig. 12 is an operating flowchart for the modification shown in Fig. 11;

Fig. 13 is a block diagram of an image processing

5   apparatus according to a prior art;

Fig. 14 is a schematic constructional block diagram of the prior art; and

Fig. 15 is a diagram for explaining a general use environment.

10

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Embodiments according to the invention will now be described hereinbelow with reference to the drawings.

[Embodiment 1]

15   The embodiment 1 relates to an example when the invention is applied to an image processing apparatus having an input unit, an output unit, and a color matching processing function.

According to a color matching process, a data

20   conversion is executed so as to equalize a color reconstruction irrespective of a device on the basis of input/output profiles showing input/output characteristics which are different every input/output device.

25   Fig. 1 shows a block diagram of the image processing apparatus according to the embodiment 1.

Information regarding characteristics of

input/output signals in each input/output device which was set into a reference state has been stored in profile data of the input unit and output unit.

Further, a parameter regarding the reference state of an input unit 104 at the time of formation of the input unit profile is added as a reference parameter 102 to the input equipment profile data. Similarly, a reference parameter 108 at the time of the formation of an output equipment profile is added to the output equipment profile data. For example, in case of a monitor which is used as input/output equipment, parameters regarding the image adjustment such as gamma characteristics, contrast, brightness, color temperature of white, and the like have been stored in the reference parameter.

As an example of a method of forming the profile data, in case of a printer, first, the apparatus is set into a reference state and a reference sample in which a certain input signal has already been known is outputted and color characteristics of the outputted sample are measured. The relation of the input/output signals is stored as profile data.

Device characteristics data regarding the input unit 104 has been stored in the input equipment profile data 101. Device characteristics data regarding an output unit 110 has been stored in the output equipment profile data 107.

User adjustment parameter storage units 103 and 109 exist in the input/output units and parameters regarding the image adjustment including values which were freely set by the user by using knobs, menu bars,

5   and the like provided for a user adjustment unit 105 and output parameter adjustment unit 111 have been stored in the storage units 103 and 109.

When the input unit or output unit is solely used without using a CMS software, ordinarily, an image is

10 inputted or outputted by using the parameters stored in the user adjustment parameter storage units.

However, when the color matching process is executed, in order to realize a color reconstruction of a high quality, it is necessary to set into a reference

15 state when each profile data is formed.

Namely, it is necessary to set the parameters of the input/output units in correspondence to the input/output profile data.

For this purpose, which one of the user adjustment

20 parameter 103 and the reference parameter 102 at the time of the formation of the input equipment profile should be used needs to be decided by a color matching processing condition setting unit 124 in accordance with the input/output environment of the image.

25 A flow of processes according to the embodiment 1 will now be described hereinbelow with reference to Fig. 2.

First, whether the color matching process is executed or not is set by the color matching processing condition setting unit 124 in a console unit 125 (S10).

When the color matching process is executed, the
5   processing parameters in the input unit 104 and output unit 110 are set to the reference values when the profiles are formed (S20).

An inputting process is executed on the basis of the reference values set in the input unit 104, thereby
10   obtaining input image data (S30).

As mentioned above even if the user adjustment parameters are used, in case of matching the colors of input and output images by using the color matching process, the reference parameter 102 which has
15   previously been added to the input equipment profile data is used in place of the user adjustment parameter 103. At this time, the user adjustment parameters are rewritten and the control of the input unit can be performed or the control of the input unit can be also
20   directly performed by using the reference parameter irrespective of the user adjustment parameters. As mentioned above, the input image data is obtained by the input equipment set in the reference state.

In the data conversion unit 106, the input image
25   data is subjected to a data conversion process 1 for converting into data (device independent signal) which

doesn't depend on the device on the basis of the input equipment profile data 101 (S40).

In the data conversion unit 112, a data conversion process 2 for converting into output image data suitable for an output device is executed on the basis of the output equipment profile data 107 (S50).

Namely, in the data conversion process 1, the input image data depending on the input unit is converted into the device independent data by using the input equipment profile data. In the data conversion process 2, the device independent data is converted into output image data which depends on the output unit by using the output equipment profile data.

In a manner similar to the input unit, even if the user adjustment parameters have been set, in case of matching the colors of the input and output images by using the color matching process, the reference parameter 108 which has previously been added to the output equipment profile data and has been set in step S20 is used in place of the user adjustment parameters 109, thereby obtaining output image data from the output unit 110 set in the reference state.

On the other hand, when a mode such that the color matching process is not executed is set in step S10, the parameters of the input unit and output unit are arbitrarily manually set in accordance with an application of the user by using the user adjustment

unit 105 and output parameter adjustment unit 111 of a console unit 25 (S70).

When the parameters of the input unit and output unit have been preset in accordance with the application of the user, those parameters can be also used.

An input process is executed in the input unit and an output process is executed in the output unit in accordance with the set parameters (S80 and S90).

Each unit of the image processing apparatus is controlled by a CPU 121 connected through a CPU bus 120.

The CPU 121 controls each of the above units by using an RAM 123, as a work memory, on the basis of, for example, a program to execute processes shown in Fig. 2 stored in an ROM 122 in accordance with the setting of the console unit 125.

According to the embodiment 1, when the color matching process is executed, since the input and output processes are executed in the input/output units by the parameters suitable for the input/output equipment profiles which are used for the color matching processes which are executed by the data conversion units 106 and 112, an effect of the CMS process can be most efficiently derived.

That is, the colors can be matched irrespective of the input/output devices.

When the color matching process is not executed, an arbitrary process can be performed on the basis of a will of the user.

[Modification 1]

5   As a modification, an example in which the invention is applied to an image processing system as shown in Fig. 3 will now be described.

The image processing system is constructed by: input equipment 204 and output equipment 205

10   corresponding to the input unit 104 and output unit 105 in the embodiment 1; and a computer 200 for performing the color matching process.

An example in the case where the user adjustment parameters exist in a memory of the computer for

15   controlling instead of the input/output equipment will now be described hereinbelow with reference to Fig. 4.

Portions similar to those in the embodiment 1 are designated by the same reference numerals.

In a manner similar to the embodiment 1, when an

20   image is inputted, whether the user adjustment parameters 103 are used or the parameters are set to the reference parameter 102 when each profile is formed is first determined in accordance with input/output environment of the image. Both of the user adjustment

25   parameters and the reference parameter have been stored in the memory of the computer for controlling. When the colors of the input and output images are matched

by a CMS (color management system) software, in a

parameter selection unit 301, the reference parameter

102 added to the input equipment profile data is

selected. On the basis of the selected parameter, the

5   input equipment is set into the reference state by an

input equipment control unit 302. In the other case

where the CMS software is not used, the user adjustment

parameters 103 adjusted by the user are selected and

the input equipment 204 is controlled by using the user

10   adjustment parameters. Image data is obtained by such

input equipment.

Even in the data conversion, a conversion similar

to that in the embodiment 1 is executed. The control

of the output equipment is also substantially the same

15   as that for the input equipment. Either one of the

user adjustment parameters 109 and reference parameter

108 is selected in accordance with the input/output

environment of the image. An output image is derived

from output equipment 210 controlled by using the

20   selected parameter.

In the image processing system shown in Fig. 3, the

reference parameter has been added to the input/output

equipment profile data. However, as shown in Fig. 5,

both of the user adjustment parameters 103 and 109 and

25   the reference parameters 102 and 108 can be also stored

into parameter storage units 401 and 402 of the

input/output equipment by disconnecting from the

input/output equipment profile data, respectively. It

is also possible to arbitrarily select both of them in

accordance with the input/output environment and to

obtain an image by the input/output equipment

5   controlled by the selected data.

Although the storing locations of the data have

been limited in the above embodiment, the invention is

not limited to the example as shown in the embodiment

but the invention can be also sufficiently applied to a

10   combination of them or a case where the storing

positions of the user adjustment parameters and

reference parameter are other than the locations

mentioned in the embodiment.

That is, the user adjustment parameters can be also

15   stored into input/output equipment main bodies.

[Embodiment 2]

In the foregoing embodiment 1, when the color

matching processing mode is set, the user cannot set a

user processing parameter.

20   Therefore, for example, when the user wants to

finely adjust the image generated by the color matching

process, the user has to set an ordinary mode in which

the color matching process is not executed and to set

parameters from the beginning.

25   In the embodiment 2, an example in which an image

can be finely adjusted for a color matching processing

result will now be described with reference to Fig. 6.

In Fig. 6, substantially the same processing steps as those in the embodiment 1 are designated by the same processing step numbers and their descriptions are omitted.

In Fig. 6, processes in steps S110 to S160 are added to the processes in the embodiment 1 in order to perform the fine adjustment mentioned above.

When the CMS processing mode is set in step S20, the color matching process (S10 to S50) is executed in a manner similar to the embodiment 1 and the image data which was color matching processed is stored into the RAM 123.

An image is outputted by using the reference parameter by the output unit 110.

Whether the output image is satisfactory or not is confirmed by the eyes (S120).

When the user satisfies the output image, the processing routine is finished.

On the other hand, when the user cannot satisfy the output image, in order to perform the fine adjustment, the parameters of the output unit are set by using the output parameter adjustment unit 111 (S130).

The image data which was CMS processed and stored in the RAM 123 is read out and an image is outputted by using the set parameters (S140).

The processes in steps S120 to S140 are repeated until a satisfactory output image can be obtained.

Each of the above embodiments has been shown and described on the assumption that, as for the selection between the user adjustment parameters and the reference parameter, when the color of the image is

5   controlled by the CMS software, the reference parameter is selected and, in the other cases, the user adjustment parameters are used. However, it is also possible to automatically select the parameters or to arbitrarily select either one of those parameters in

10   accordance with a desire of the user case by case.

Further, although the case where the number of reference parameters when the profile is formed is set to one parameter has been shown above, it is also possible to construct in a manner such that there are a

15   plurality of reference parameters corresponding to the user adjustment values and a reference parameter at the time of control is newly formed as interpolation data of them.

Although the embodiments have been described above

20   with respect to the input/output equipment, the invention can be also applied to any other various combinations such as (scanner and monitor), (monitor and printer), and the like as a combination of the input/output equipment.

25   [Embodiment 3]

The embodiment 3 of the invention will now be described in detail hereinbelow with reference to the

drawings.

The embodiment 3 of the invention applied to a copying apparatus with a monitor for displaying an original image and a previewer having functions for a selection of an output portion, an edition of a color, and the like on a monitor screen will now be described. Fig. 7 shows a schematic constructional block diagram of such a copying apparatus. Fig. 8 shows a schematic block diagram showing an arrangement of functional blocks in Fig. 7. The same component elements in Figs. 7 and 8 are designated by the same reference numerals.

An image of an original is read by the image scanner 10. The image scanner 10 outputs the read image data as an RGB signal. The scanner color conversion device 12 converts the output signal of the RGB colorimetric system (color system) of the scanner 10 into the values of the XYZ colorimetric system in consideration of the reading characteristics of the image scanner 10 in accordance with the scanner profile 14 which has been prepared in accordance with the reading characteristics of the image scanner 10. An output of the color conversion device 12 is a standard color signal which doesn't depend on the image input device. It will be obviously understood that the standard color space is not limited to the XYZ colorimetric system and another arbitrary colorimetric system can be used so long as it can absorb a device

dependence.

Data regarding the color characteristics of the scanner 10 has been stored in the scanner profile 14. Specifically speaking, a color conversion matrix from

5   RGB to XYZ or a lookup table (LUT) has been stored.

The signal conversion device 16 corrects an output of the conversion device 12 in accordance with ambient color information which is supplied from the ambient light sensor 18 for detecting color components or a

10   color distribution of the ambient light and white information and information of a background color of the monitor 24 to display the read image. In the embodiment, the white information and the information of the background color of the monitor 24 are supplied

15   from the monitor profile 22 having the coloring characteristics of the monitor 24.

In accordance with the coloring characteristics information from the monitor profile 22, the monitor color conversion device 20 converts the output signal

20   of the XYZ colorimetric system of the signal conversion device 16 into the RGB values in consideration of the coloring characteristics of the monitor 24 and supplies to the monitor 24. The monitor 24 displays the image of the original as a preview image.

25   Data regarding the coloring characteristics of the monitor 24, specifically speaking, a color temperature and a light emission luminance of the monitor 24, a

chromaticity value of a fluorescent material, color

conversion information from the standard color space to

the device dependence color signal, and the like have

been stored in the monitor profile 22. The monitor

5   background color information which is supplied from the

monitor profile 22 to the signal conversion device 16

includes background color information which is at

present displayed by the monitor 24 and the background

color information when the monitor profile 22 is

10   formed.

In accordance with the characteristics information

from a printer profile 28 having coloring

characteristics of the printer 30, the printer color

conversion device 26 converts the output signal of the

15   XYZ colorimetric system of the signal conversion device

16 into CMYK signal in consideration of the coloring

characteristics of the printer 30 and supplies to the

printer 30. The printer 30 prints and outputs the

image of the original onto a recording paper in

20   accordance with the color signal from a color

conversion device 26.

As shown in Fig. 8, the scanner color conversion

device 12 is enclosed in a scanner unit 32. The signal

conversion device 16, monitor color conversion device

25   20, printer color conversion device 26, and printer 30

are enclosed in a printer unit 34. The monitor 24 is

put on an upper portion of the scanner unit 32. The

ambient light sensor 18 is arranged beside the monitor 24.

Fig. 9 shows a schematic constructional block diagram in the signal conversion device 16. Adaptation ratios corresponding to one or two or more environments which are presumed in the case where the ambient light is a predetermined standard light source (A, C, D93, D65, D50, F, etc.) have been stored in an adaptation ratio storage 40. An adaptation ratio also corresponding to a background color (for example, gray scale) when an image is seen has also been stored in the adaptation ratio storage 40. An adaptation ratio determination device 42 selects the adaptation ratios corresponding to the present ambient light and the background color of the monitor from the adaptation ratio storage 40 in accordance with the ambient light information from the ambient light sensor 18 and the monitor white information and the monitor background color information from the monitor profile 22 and supplies to a reference white calculation device 44.

The reference white calculation device 44 calculates reference white suitable for the ambient light and an observation environment such as color temperature, background color, and the like of the monitor 24 in accordance with the adaptation ratios from the adaptation ratio determination device 42, the ambient light information from the ambient light sensor

18, and the monitor white information and monitor background color information from the monitor profile 22. Its calculating method will be described in detail hereinlater.

5   An image conversion device 46 converts signals (Xi, Yi, Zi) from the scanner color conversion device 12 in accordance with reference white (Xw, Yw, Zw, xw, yw) calculated by the reference white calculation device 44 and generates signals (Xo, Yo, Zo) of the XYZ

10   colorimetric system.

Fig. 10 is a schematic diagram showing the relations among the ambient light, white and background color of the monitor, and reference white. The ambient light is based on the reference light source. Fig. 10

15   shows reference white colors as an example with respect to two background colors. An output of the ambient light sensor 18 can be any one of the spectral data, color signals of XYZ, RGB, or the like, and manual input of those color signals. In Fig. 10, the ambient

20   light information is shown as a reference light source W. The monitor white information from the monitor profile 22 is the color temperature, luminance value, chromaticity value, etc. and is shown as a monitor white point V in Fig. 10.

25   As described above, when observing the image which is displayed on the monitor screen, it is considered that the human being isn't perfectly adaptive to only

monitor white but is adaptive to both of monitor white and the ambient light at a certain ratio. As shown in Fig. 10, therefore, reference white serving as a color observing reference is located between monitor white and the ambient light (reference light source). It is now assumed that an adaptation ratio to monitor white is set to s, an adaptation ratio to the ambient light is set to 1-s, the ambient light information which is obtained from the ambient light sensor 18 is set to Wx, Wy, Wz, wx and wy, monitor white signals which are obtained from the monitor profile 22 are set to Vx, Vy, Vz, vx, and vy, and reference white signals to be calculated are set to Xw, Yw, Zw, xw, and yw, respectively. Thus, Xw, Yw, Zw, xw, and yw can be calculated by the following equations (1) and (2). Namely, with regard to three stimulus values,

$$Xw = (1-s) \cdot Wx + s \cdot Vx$$
$$Yw = (1-s) \cdot Wy + s \cdot Vy \qquad \ldots (1)$$
$$Zw = (1-s) \cdot Wz + s \cdot Vz$$

With regard to the chromaticity values,

$$xw = (1-s) \cdot wx + s \cdot vx$$
$$yw = (1-s) \cdot wy + s \cdot vy \qquad \ldots (2)$$

Since s depends on the ambient light at the time of the image observation and the background color of the monitor 24, the adaptation ratio (s : 1-s) changes depending on the ambient light and the background color of the image. In association with it, the reference

white point also changes every ambient light and
background color. For example, when the background
color is changed from black to white at a gray scale
level, as the background color approaches black, the
5   adaptation ratio to the ambient light increases
irrespective of the color temperature of the monitor 24
and ambient light.

It is, therefore, necessary to decide the
adaptation ratio in accordance with not only the
10   ambient light but also the background color to be
observed. In the embodiment, by deciding as mentioned
above, the optimum reference white point is calculated.

A method of converting the whole image on the basis
of the reference white signal calculated in this manner
15   will now be described.

The image which is displayed on the monitor screen
is observed on the basis of reference white calculated
as mentioned above. On the other hand, the printed
matter is adaptive to white of the paper or white of
20   the ambient light. It is now assumed that the
reference white is set to Xw, Yw, and Zw,
white of the ambient light is set to Wx, Wy, and Wz,
the image signals (input signals of the image
conversion device) which are inputted from the scanner
25   color conversion device 12 to the signal conversion
device 16 are set to Xi, Yi, and Zi, and the image
signals which are outputted from the image conversion

device 46 of the signal converting apparatus are set to Xo, Yo, and Zo. The following equation (3) as a modification of Von Kreis's equation is satisfied. Namely,

5

$$\begin{pmatrix} Xo / Xw \\ Yo / Yw \\ Zo / Zw \end{pmatrix} = \begin{pmatrix} Xi / Wx \\ Yi / Wy \\ Zi / Wz \end{pmatrix} \quad \dots (3)$$

10   By modifying the equation (3), the following equation (4) is obtained.

$$\begin{pmatrix} Xo \\ Yo \\ Zo \end{pmatrix} = \begin{pmatrix} Xi \\ Yi \\ Zi \end{pmatrix} \begin{pmatrix} Xw / Wx \\ Yw / Wy \\ Zw / Wz \end{pmatrix} \quad \dots (4)$$

15

The following equation (5) can be also used by also including the contrast conversion of the image in consideration of the visual sense characteristics of

20   the human being into the equation (4). Namely,

$$\begin{pmatrix} Xo / Xw \\ Yo / Yw \\ Zo / Zw \end{pmatrix} = \begin{pmatrix} Xi / Wx \\ Yi / Wy \\ Zi / Wz \end{pmatrix}^{\gamma} \quad \dots (5)$$

25

By modifying the equation (5),

$$\begin{bmatrix} Xo \\ Yo \\ Zo \end{bmatrix} = \begin{bmatrix} Xi \ / \ Wx \\ Yi \ / \ Wy \\ Zi \ / \ Wz \end{bmatrix}^{\gamma} \begin{bmatrix} Xw \\ Yw \\ Zw \end{bmatrix} \qquad \dots (6)$$

5   The monitor color conversion device 20 converts the

image signals Xo, Yo, and Zo obtained as mentioned

above from the XYZ colorimetric system to the RGB

colorimetric system in accordance with the conversion

information from the monitor profile 22.

10   By such a color matching process, color tones of a

source image and an output image can be matched.

Particularly, by obtaining the reference white signal

also in consideration of the background color, a good

color matching process can be performed.

15   In the above embodiment, when the adaptation ratio

(s : 1-s) or s is decided, the adaptation ratio has

been changed in accordance with both of the ambient

light and the background color. However, the

adaptation ratio can be also set in accordance with the

20   observation environment such as color temperature of

the monitor, reflected light from the monitor, or the

like.

Fig. 11 shows a schematic constructional block

diagram of a modification of the above embodiment. In

25   the modification, the user can select the setting of a

color process. Specifically speaking, in case of

performing the color process at a high precision, a

predetermined background color is displayed on the

monitor 24 and both of the display image and the

background color, namely, the whole screen of the

monitor 24 is controlled, thereby more accurately

5   matching the original image to be displayed on the

monitor 24 and the original image which is seen.

Reference numeral 50 denotes a color processing setting

device to set a color processing method. There are a

mode to use the present background color of the monitor

10   24 as it is and a mode to display a specific background

color which has previously been selected. The user

selects the latter mode when he wants to perform a

color management at a high accuracy.

Fig. 12 shows a flowchart of a main operation

15   portion of the modification shown in Fig. 11.

By the color processing setting device 50, the user

sets the color processing method (color matching mode)

to be executed by the signal conversion device 16 in

accordance with an application (S1). It can be set by

20   a menu bar or the like or can be also selected by

pushing a button. Further, it is also possible to

determine the default in a manner such that the color

managing process as described in the embodiment shown

in Fig. 7 is performed and a highly-accurate color

25   management is executed in the other cases.

In case of the highly-accurate color management

(S1), the background color of the screen of the monitor

24 is set to a predetermined color (S5). In the case where the highly-accurate color management is not performed (in case of the ordinary color management) (S1), the present background color is maintained as it

5   is.

In order to perform the highly-accurate color management, it is necessary to control the background color. Therefore, when a plurality of windows are opened on the same screen, the other windows are hidden

10   by the background color. On the other hand, when the highly-accurate color management is not performed, processes can be executed in parallel with reference to the other windows. The user, accordingly, sets the color processing method on the basis of the application

15   (whether a priority is given to the precision of the color matching or not) in step S1.

The subsequent processes are substantially the same as those in the embodiment shown in Fig. 7. The signal conversion device 16 sets the optimum adaptation ratio

20   from the ambient light information from the ambient light sensor 18, the monitor white information, and the background color of the monitor and converts the output signal of the scanner color conversion device 12 in accordance with the reference white signal that is

25   decided on the basis of the adaptation ratio (S2). The monitor color conversion device 20 converts the output signal of the signal conversion device 18 from the XYZ

colorimetric system to the RGB colorimetric system
(S3). The output image signal of the monitor color
conversion device 20 is displayed at a predetermined
position on the screen of the monitor 24 (S4).

5   In case of the highly-accurate color management,
since the background color is a predetermined color,
the color matching can be performed at a higher
accuracy. As a background color in this case, for
example, a background color which has been set in the
10   environment at the time of the formation of the profile
or a standard environment at the time of the color
observation or a background color that is optimum to
every environment has been prepared and the proper
background color is selected among them in accordance
15   with the present environment.

In the modification shown in Fig. 11, the decided
background color has been displayed only in case of
selecting the highly-accurate color management process.
However, it is also possible to enable whether the
20   color management is performed or not to be selected and
to automatically display the determined background
color in case of executing the color management.

As for the background color of the monitor when the
image is observed, the standard observing condition at
25   the time of the formation of the profile can be
determined and such information can be stored into the
profile as mentioned above. However, in any case, it

will be understood that when a luminance of the background color to be displayed on the monitor is lower than that of white in the observation image (white in the print original), it is more desirable in case of matching both of the colors. White in the observation image (white in the print original) is obtained from a reflectance of the paper which has previously been known and the light source information derived from the ambient light sensor 18. When the luminance of white in the print image is equal to or less than the luminance of the highest output of the monitor, it is desirable to use the luminance of the background color having a value smaller than that of white in the observation image.

For example, when the image is observed in an environment in which the luminance of white in the observation image and the highest luminance of the monitor are equal and, after that, the luminance of the ambient light of the room decreases, a phenomenon such that both of the colors cannot be matched because the background color of the monitor is too bright occurs. However, by setting the luminance of the monitor background color to be lower than that of white in the observation image, an environment in which the color matching is more available can be formed.

As means for obtaining the ambient light information, it is possible to detect the ambient light

of the environment in which the image is at present

observed by a sensor or to previously measure the

ambient light by the user by using an illumination

photometer, a luminance meter, or the like and to input

5   the measured value to the signal conversion device 16.

It is also possible to use a method whereby several

selection items have already been made and a proper

value that is closest to the present environment is

selected among them.

10   By calculating white in the observation image from

the ambient light information obtained and the well-

known reflectance of the paper and by changing the

background color of the monitor so that the luminance

of the background color is lower than that of such

15   white, both of the colors can be matched.

The invention is not limited to the above

embodiment. For example, the invention can be applied

to the color signal conversions of various input/output

equipment. Namely, the invention can be used in every

20   image processing apparatus for performing the color

signal conversion.

It will be obviously understood that the monitor

display is not limited to the CRT display but can also

use a liquid crystal display.

25   According to the embodiment 3 and its modification

as described above, in the correction to match the

light source color and the observation color of the

object color, the reference white is calculated on the
basis of not only the ambient light but also the
background color in case of observing the image and the
whole image is converted in accordance with the

5   calculated reference white. Therefore, the observation
color of the display image can be also matched to a
different background color.

By forcedly setting the background color to a
predetermined color, the observation color can be more

10 accurately matched.

By setting the luminance of the background color to
be lower than that of white of the image (white in the
print image), both of the colors can be matched.

By performing the color temperature conversion by   ·

15 reference white suitable for the observation
environment, the color tones can be preferably matched.

A highly-accurate color matching can be provided on
the basis of an application of the user.

<Other embodiments>

20 The invention can be applied to a system
constructed by a plurality of equipment (for example, a
host computer, an interface equipment, a reader, a
printer, or the like) or can be also applied to an
apparatus comprising one equipment (for example, a

25 copying apparatus or a facsimile apparatus).

An invention embodied by a method whereby program

codes of a software to realize the functions of the
embodiment are supplied to a computer in an apparatus
or system connected to various devices so as to make
the devices operative in order to realize the functions

5   of the foregoing embodiments and the various devices
are operated in accordance with the programs stored in
the computer (CPU or MPU) of the system or apparatus is
also included in the scope of the invention.

    In such a case, the program codes themselves of the

10   software realize the functions of the foregoing
embodiments and the program codes themselves and means
for supplying the program codes to the computer, for
example, a memory medium in which the program codes
have been stored construct the invention.

15   As such a memory medium to store the program codes,
for example, it is possible to use a floppy disk, a
hard disk, an optical disk, a magnetooptic disk, a CD-
ROM, a magnetic tape, a non-volatile memory card, an
ROM, or the like can be used.

20   It will be obviously understood that the program
codes are included in the embodiments of the invention
even in not only a case where the functions of the
foregoing embodiments are realized by executing the
supplied program codes by the computer but also a case

25   where the functions of the foregoing embodiments are
realized in cooperation with the OS (operating system)
by which the program codes operate in the computer or

another application software or the like.

Further, it will be also obviously understood that the invention also incorporates a case where the supplied program codes are stored into a memory provided for a function expansion board of a computer or a function expansion unit connected to a computer and, after that, a CPU or the like provided for the function expansion board or function expansion unit executes a part or all of the actual processes on the basis of instructions of the program codes, and the functions of the foregoing embodiments are realized by the processes.

Although the present invention has been described above with respect to the preferred embodiments, the invention is not limited to the foregoing embodiments but many modifications and variations are possible within the spirit and scope of the appended claims of the invention.

WHAT IS CLAIMED IS:

1. An image processing apparatus comprising:

setting means for manually setting a first color processing parameter;

5   first color processing means for performing a first color process by using said first color processing parameter;

storing means for storing a second color processing parameter set in correspondence to said first color

10   processing parameter as a reference value; and

second color processing means for performing a second color process different from said first color process by using said second color processing parameter,

15   wherein in case of making said second color processing means function, said first color processing parameter is set to said reference value.

2. An apparatus according to claim 1, wherein on

20   the basis of characteristics of an input unit or an output unit, said second color processing means executes said second color process by using said second color processing parameter so as to reproduce an image at a high fidelity.

25

3. An apparatus according to claim 1, further having resetting means for resetting said first color

processing parameter corresponding to output means when an output image derived by said second color process cannot be satisfied,

and wherein said first color processing means

5 executes said first color process to the image data which was subjected to said second color process on the basis of said reset first color processing parameter, and

said resetting process and the first color process

10 based on said first color processing parameter set by said resetting means are repetitively executed until the output image can be satisfied.

4. An apparatus according to claim 1, wherein said

15 storing means stores said second color processing parameter and said reference value so as to correspond to each other.

5. An image processing apparatus having first and

20 second color matching modes for performing different color matching processes, comprising:

selecting means for selecting the color matching mode on the basis of an instruction of a user; and

setting means for setting a background color on a

25 display screen to a predetermined color when said second color matching mode is selected by said selecting means.

6.   An apparatus according to claim 5, further comprising:

storing means for storing a profile according to said background color; and

5   color matching processing means for performing the color matching process by using said profile.

7.   An apparatus according to claim 5, wherein in said color matching process, a color adapting process
10   according to said background color and an illumination light to illuminate said display screen is executed.

8.   An image processing method comprising:

a setting step of manually setting a first color
15   processing parameter;

a first color processing step of performing a first color process by using said first color processing parameter;

a storing step of storing a second color processing
20   parameter set in correspondence to said first color processing parameter as a reference value; and

a second color processing step of performing a second color process different from said first color process by using said second color processing
25   parameter,

wherein in case of making said second color processing means function, said first color processing

parameter is set to said reference value.

9. A recording medium to store programs to realize an image processing method comprising:

5 a setting step of manually setting a first color processing parameter;

a first color processing step of performing a first color process by using said first color processing parameter;

10 a storing step of storing a second color processing parameter set in correspondence to said first color processing parameter as a reference value; and

a second color processing step of performing a second color process different from said first color

15 process by using said second color processing parameter,

wherein in case of making said second color processing means function, said first color processing parameter is set to said reference value.

20

10. An image processing method having first and second color matching modes for performing different color matching processes, comprising:

a selecting step of selecting the color matching

25 mode on the basis of an instruction of a user; and

a setting step of setting a background color on a display screen to a predetermined color when said

second color matching mode is selected by said

selecting step.

11.   A recording medium to store programs to realize

5   an image processing method having first and second

color matching modes for performing different color

matching processes, comprising:

a selecting step of selecting the color matching

mode on the basis of an instruction of a user; and

10   a setting step of setting a background color on a

display screen to a predetermined color when said

second color matching mode is selected by said

selecting step.

ABSTRACT OF THE DISCLOSURE

An image processing apparatus is constructed by a setting circuit for manually setting a first color processing parameter, a first color processing circuit

5   for performing a first color process by using the first color processing parameter, a storing circuit for storing a second color processing parameter set in correspondence to the first color processing parameter as a reference value, and a second color processing

10   circuit for performing a second color process different from the first color process by using the second color processing parameter, wherein in case of making the second color processing circuit function, the first color processing parameter is set to the reference
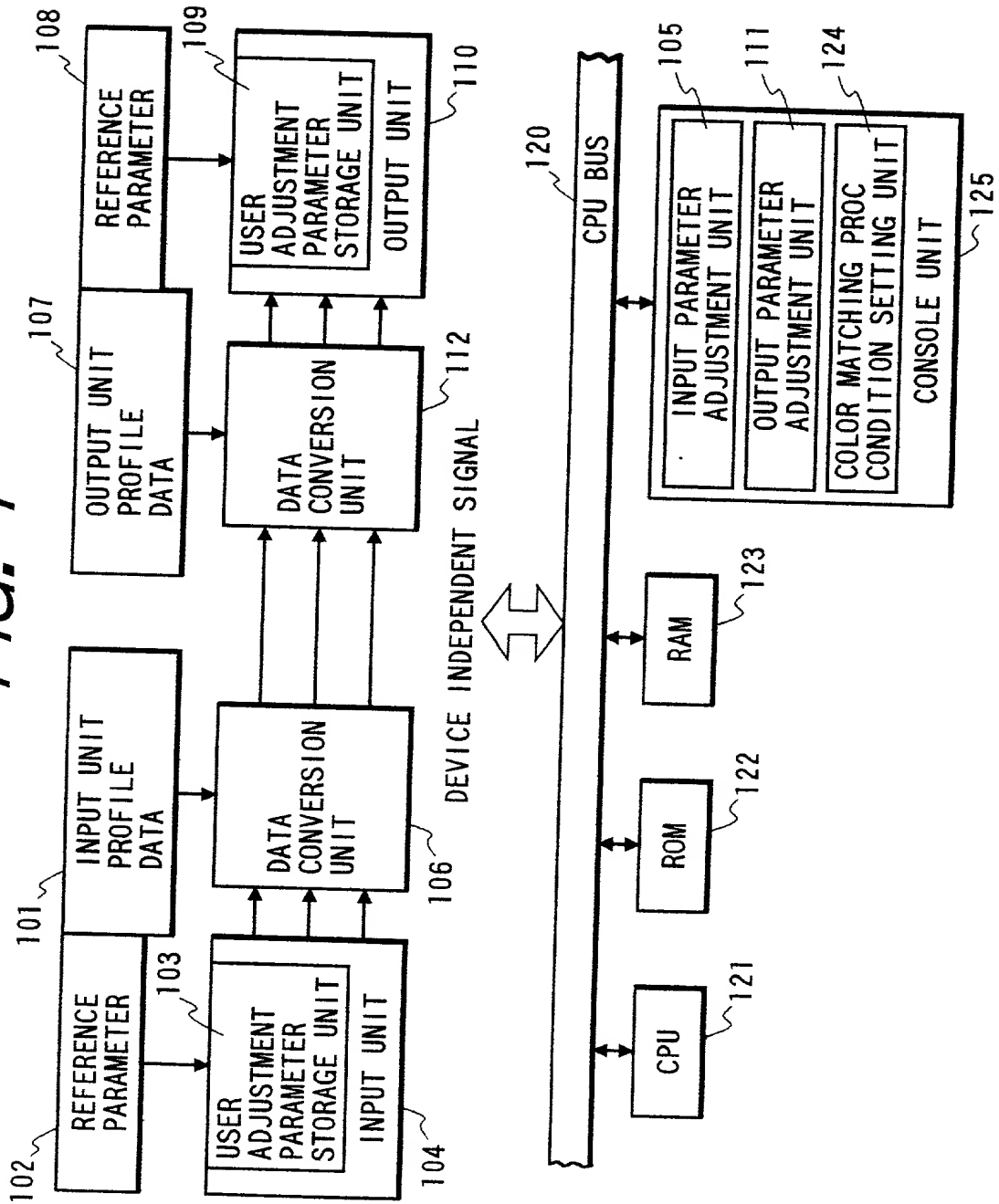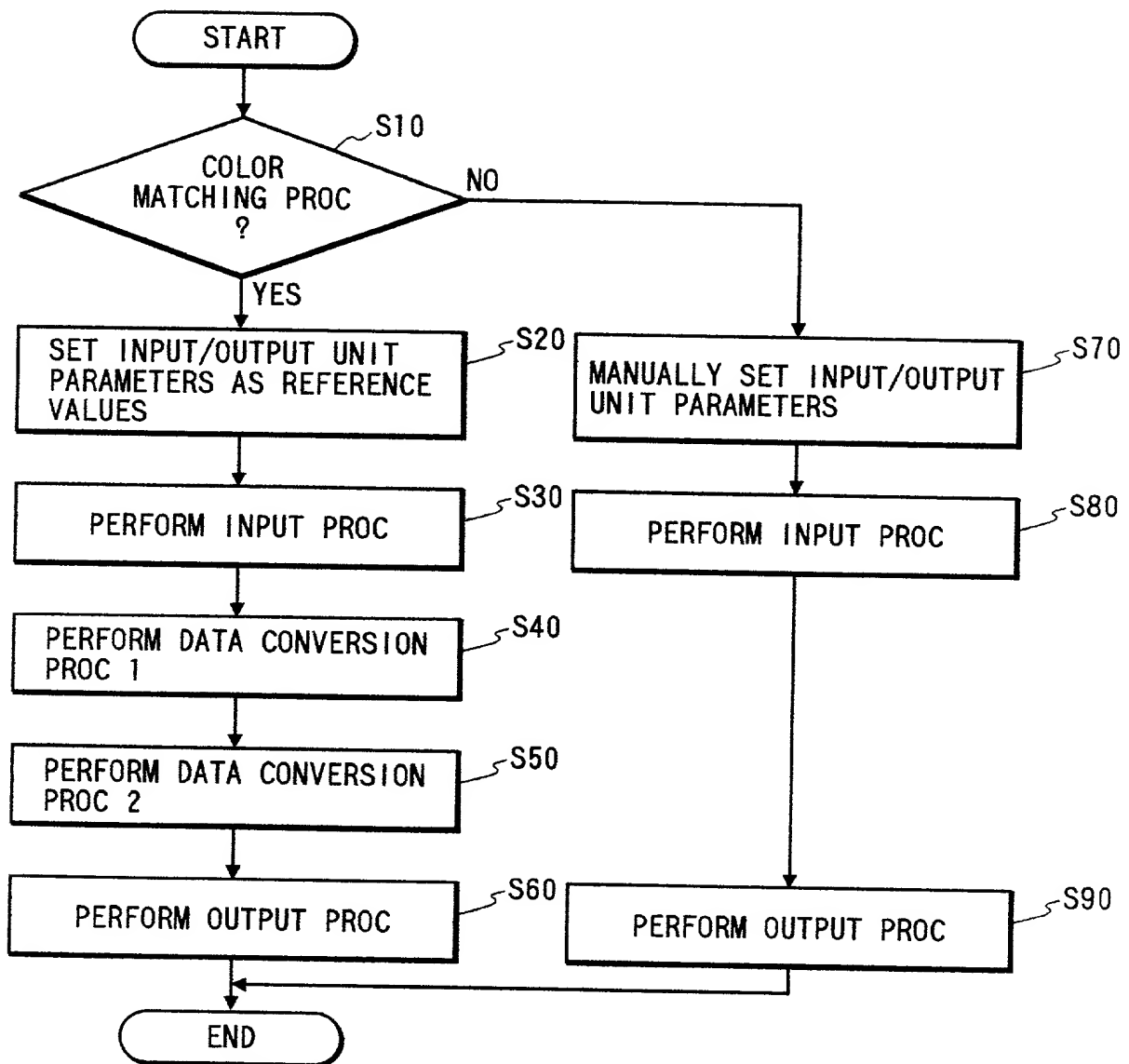
15   value.

FIG. 1

FIG. 2

```
         ┌─────────┐
         │  START  │
         └────┬────┘
              │
              ▼
         ╱─────────╲  S10
        ╱   COLOR   ╲
       ╱  MATCHING   ╲      NO
       ╲  PROC  ?    ╱──────────────────────┐
        ╲           ╱                        │
         ╲─────────╱                         │
              │ YES                          │
              ▼                              ▼
   ┌──────────────────────┐ S20   ┌──────────────────────┐ S70
   │ SET INPUT/OUTPUT UNIT│       │ MANUALLY SET INPUT/  │
   │ PARAMETERS AS        │       │ OUTPUT UNIT          │
   │ REFERENCE VALUES     │       │ PARAMETERS           │
   └──────────┬───────────┘       └──────────┬───────────┘
              │                              │
              ▼                              ▼
   ┌──────────────────────┐ S30   ┌──────────────────────┐ S80
   │  PERFORM INPUT PROC  │       │  PERFORM INPUT PROC  │
   └──────────┬───────────┘       └──────────┬───────────┘
              │                              │
              ▼                              │
   ┌──────────────────────┐ S40              │
   │ PERFORM DATA         │                  │
   │ CONVERSION PROC 1    │                  │
   └──────────┬───────────┘                  │
              │                              │
              ▼                              │
   ┌──────────────────────┐ S50              │
   │ PERFORM DATA         │                  │
   │ CONVERSION PROC 2    │                  │
   └──────────┬───────────┘                  │
              │                              │
              ▼                              ▼
   ┌──────────────────────┐ S60   ┌──────────────────────┐ S90
   │  PERFORM OUTPUT PROC │       │  PERFORM OUTPUT PROC │
   └──────────┬───────────┘       └──────────┬───────────┘
              │◄─────────────────────────────┘
              ▼
         ┌─────────┐
         │   END   │
         └─────────┘
```

FIG. 3

FIG. 4

FIG. 5

FIG. 6

```
                    ┌─────────┐
                    │  START  │
                    └────┬────┘
                         │
                    ╱────┴────╲  S10
                   ╱   COLOR   ╲        NO
                  ╱  MATCHING   ╲──────────────────┐
                  ╲   PROC ?    ╱                  │
                   ╲           ╱                   │
                    ╲────┬────╱                    │
                       YES│                        │
                ┌─────────┴─────────┐ S20  ┌───────┴──────────┐ S70
                │ SET INPUT/OUTPUT  │      │ MANUALLY SET      │
                │ UNIT PARAMETERS   │      │ INPUT/OUTPUT      │
                │ AS REFERENCE VALUES│      │ UNIT PARAMETERS   │
                └─────────┬─────────┘      └───────┬──────────┘
                          │                        │
                ┌─────────┴─────────┐ S30  ┌───────┴──────────┐ S80
                │ PERFORM INPUT     │      │ PERFORM INPUT     │
                │ PROC              │      │ PROC              │
                └─────────┬─────────┘      └───────┬──────────┘
                          │                        │
                ┌─────────┴─────────┐ S40          │
                │ PERFORM DATA      │              │
                │ CONVERSION PROC 1 │              │
                └─────────┬─────────┘              │
                          │                        │
                ┌─────────┴─────────┐ S50          │
                │ PERFORM DATA      │              │
                │ CONVERSION PROC 2 │              │
                └─────────┬─────────┘              │
                          │                        │
                ┌─────────┴─────────┐ S110 ┌───────┴──────────┐ S90
                │ PERFORM STORAGE   │      │ PERFORM OUTPUT    │
                │ PROC              │      │ PROC              │
                └─────────┬─────────┘      └───────┬──────────┘
                          │                        │
                ┌─────────┴─────────┐ S60          │
                │ PERFORM OUTPUT    │              │
                │ PROC              │              │
                └─────────┬─────────┘              │
                          │                        │
                     ╱────┴────╲ S120              │
                    ╱           ╲      NO           │
                    ╲   OK ?    ╱──────────┐        │
                     ╲         ╱           │        │
                      ╲───┬───╱            │        │
                       YES│      ┌─────────┴──────┐ S130
                          │      │ SET OUTPUT UNIT │
                          │      │ PARAMETER       │
                          │      └─────────┬──────┘
                          │                │
                          │      ┌─────────┴──────┐ S140
                          │      │ PERFORM OUTPUT  │
                          │      │ PROC            │
                          │      └─────────┬──────┘
                          │                │
                    ┌─────┴────┐
                    │   END    │
                    └──────────┘
```
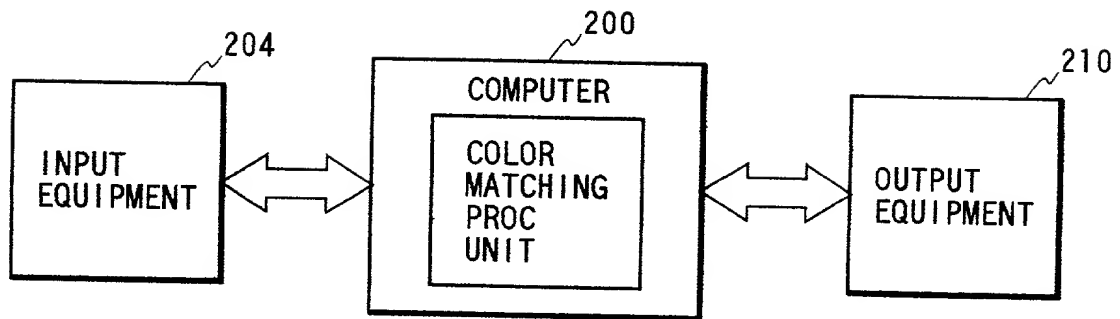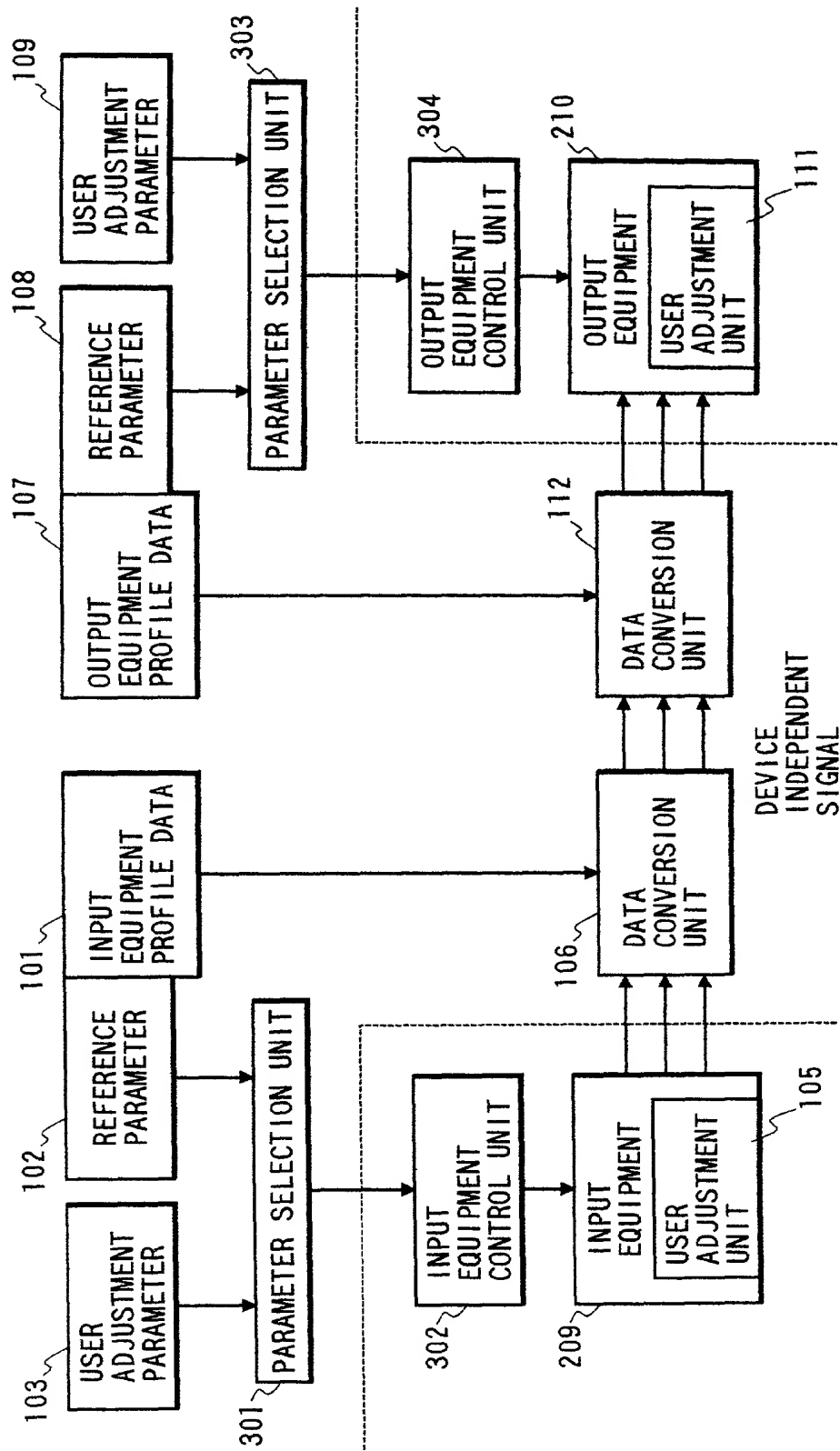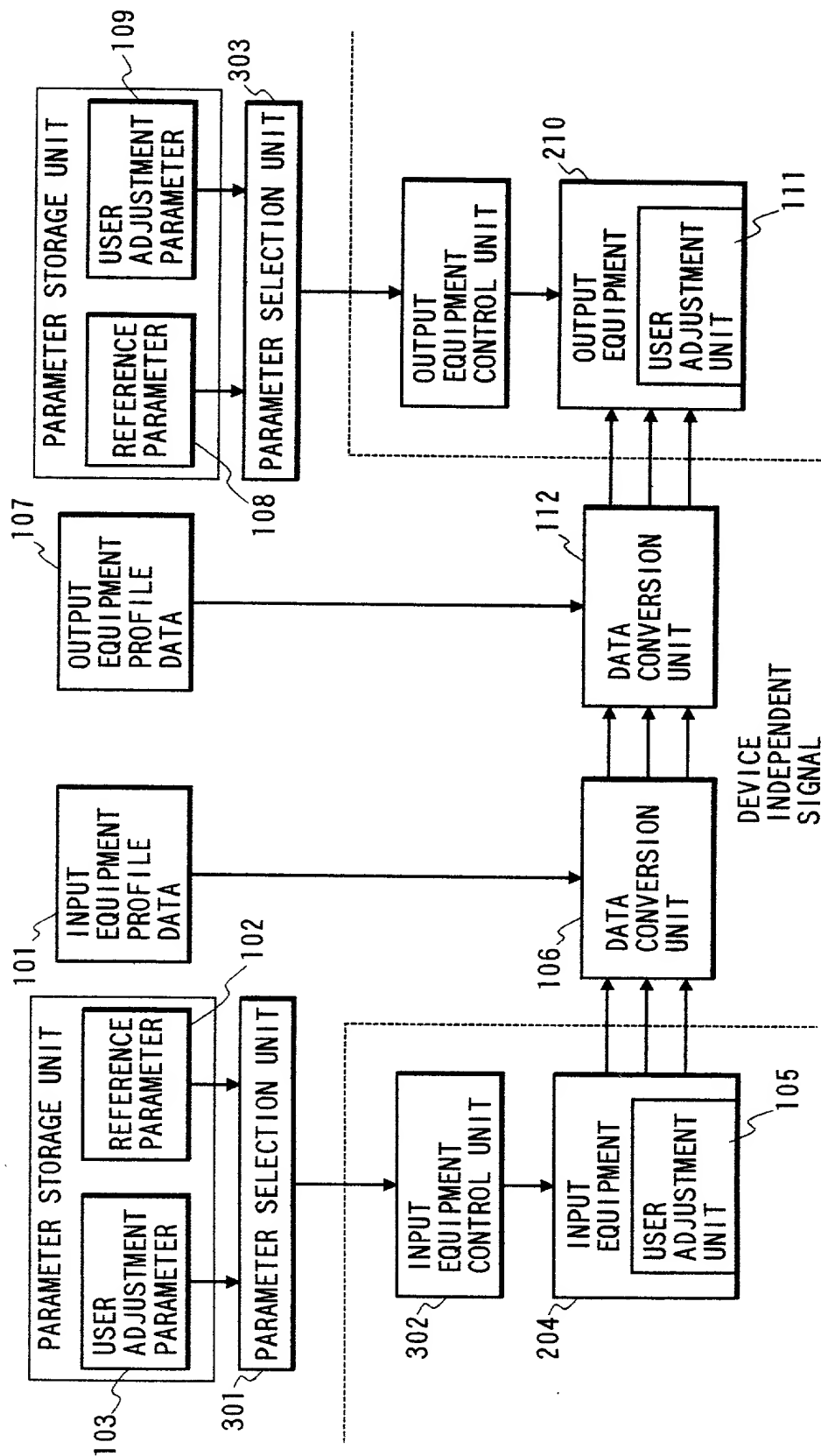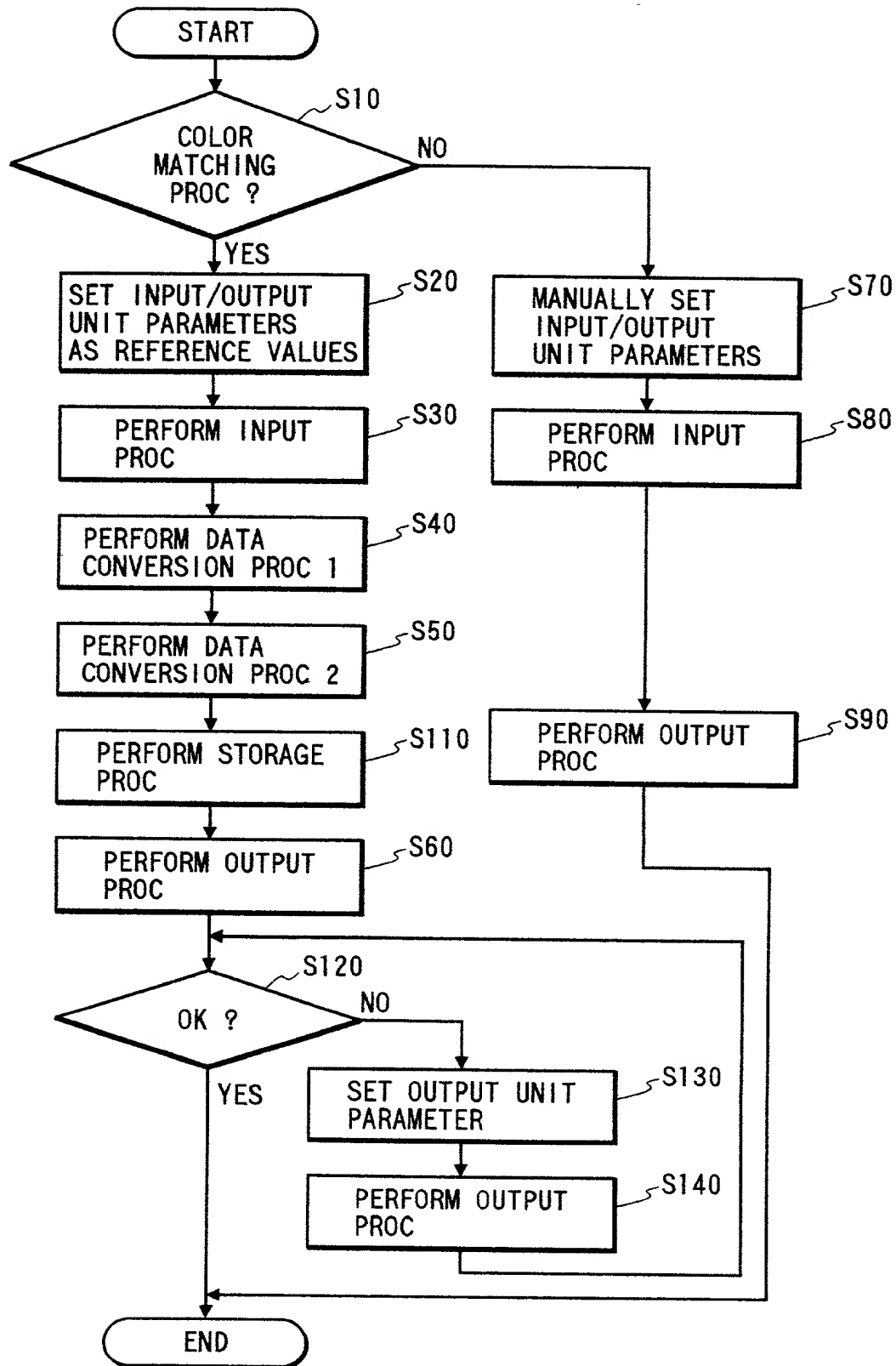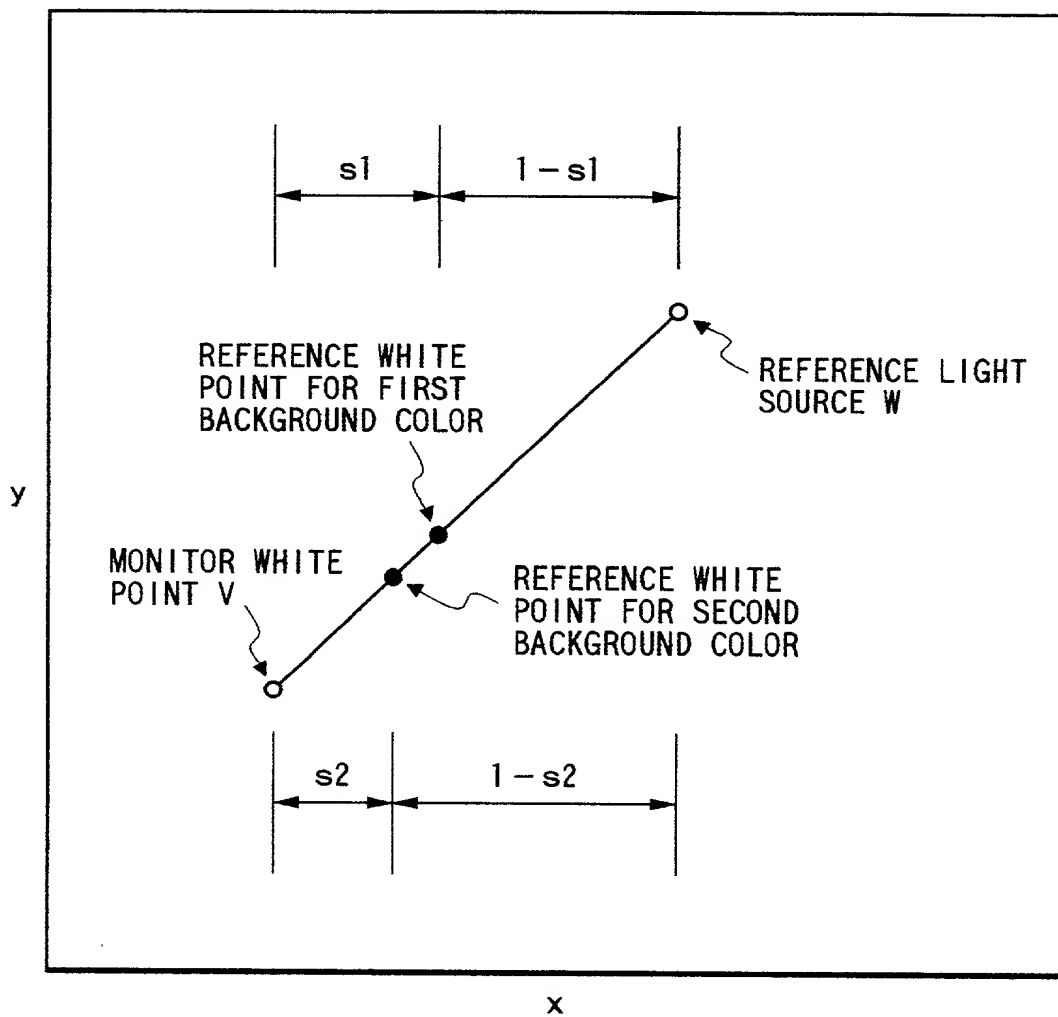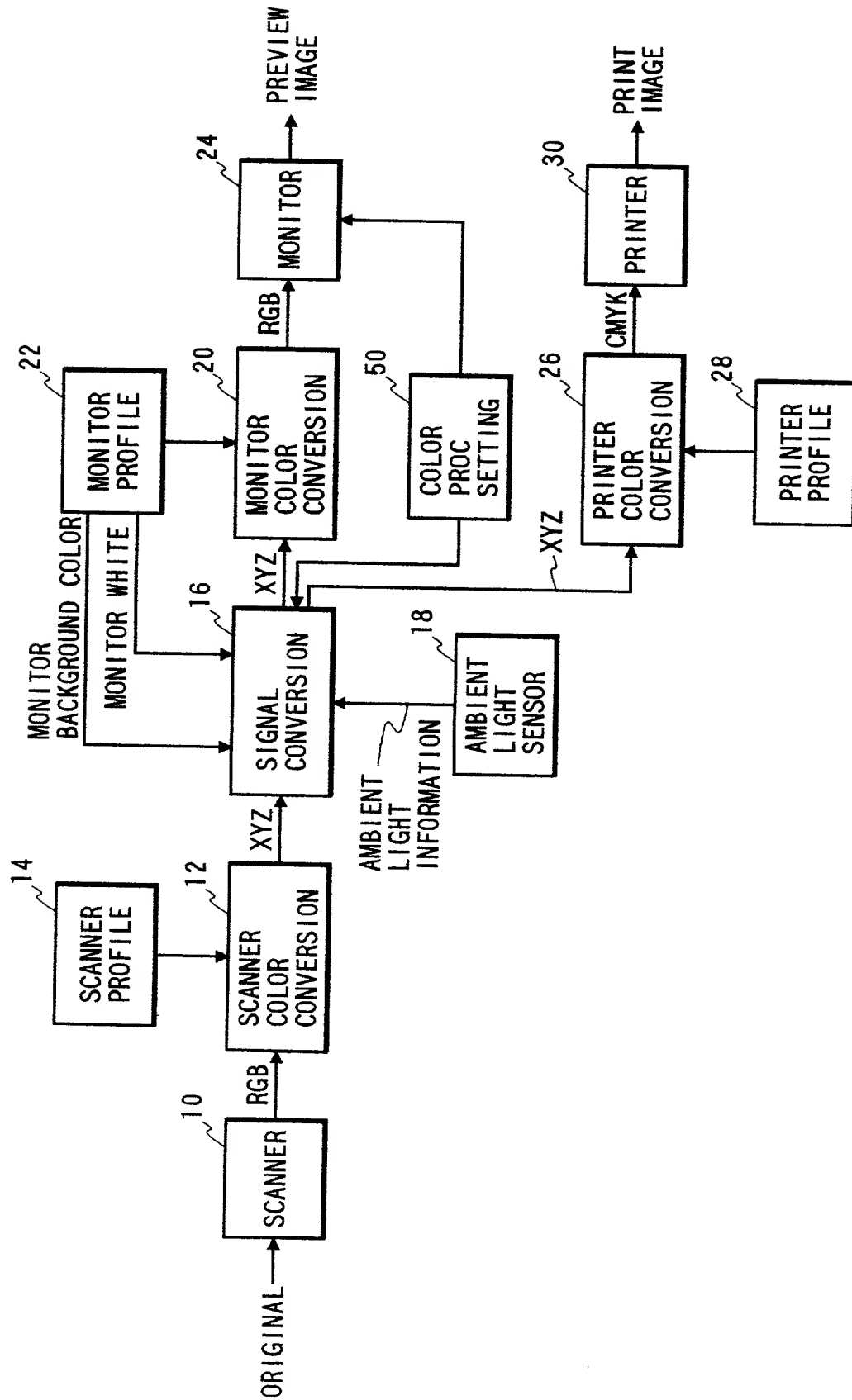
FIG. 7
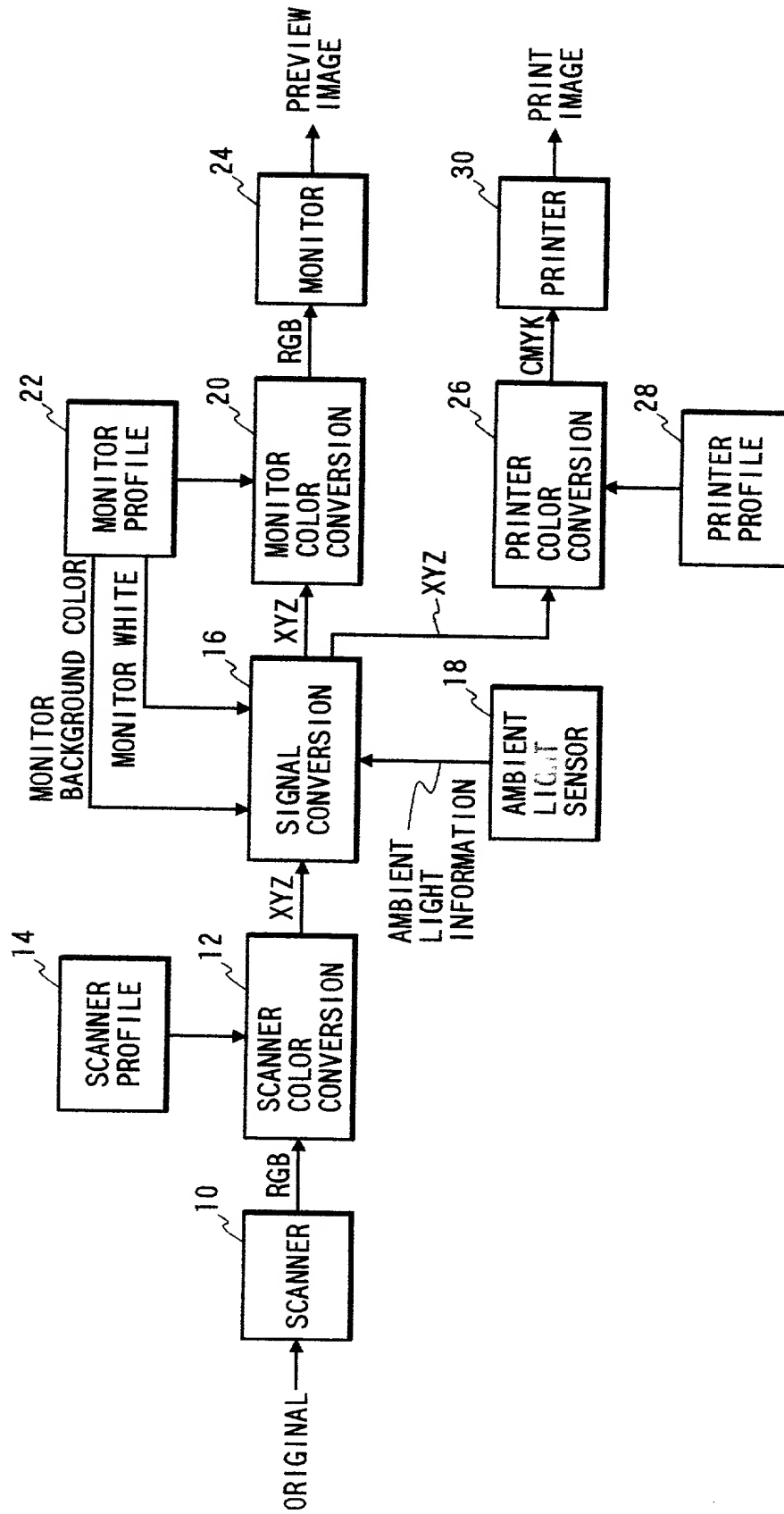
FIG. 8

FIG. 9

FIG. 10

FIG. 11

FIG. 12
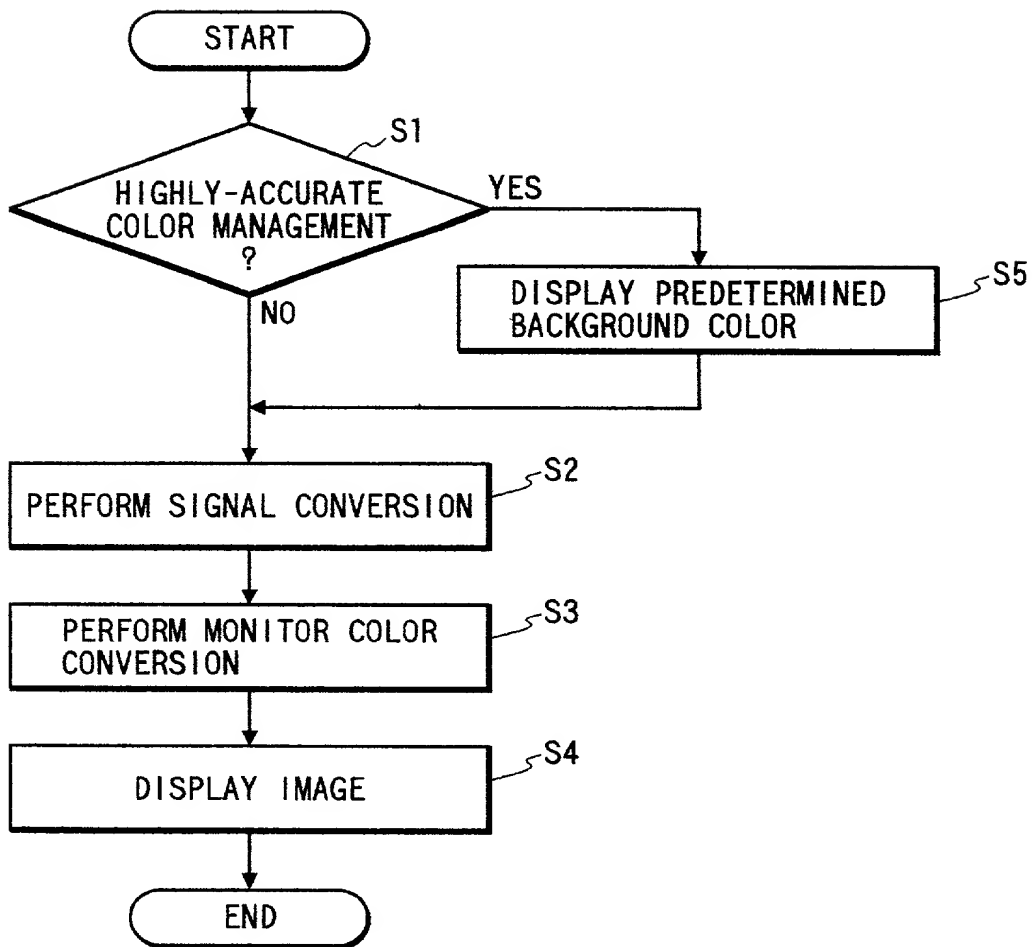
```
        ┌──────────┐
        │  START   │
        └──────────┘
              │
              ▼
          ╱◇╲ S1
      ╱         ╲
   ╱  HIGHLY-ACCURATE ╲  YES
  ◇  COLOR MANAGEMENT  ◇──────────┐
   ╲        ?        ╱            │
      ╲         ╱                 ▼
          ╲◇╱            ┌─────────────────────┐
           │ NO          │ DISPLAY PREDETERMINED│ S5
           │             │ BACKGROUND COLOR     │
           │             └─────────────────────┘
           │◄──────────────────────┘
           ▼
  ┌─────────────────────┐
  │ PERFORM SIGNAL CONVERSION │ S2
  └─────────────────────┘
           │
           ▼
  ┌─────────────────────┐
  │ PERFORM MONITOR COLOR │ S3
  │ CONVERSION           │
  └─────────────────────┘
           │
           ▼
  ┌─────────────────────┐
  │ DISPLAY IMAGE        │ S4
  └─────────────────────┘
           │
           ▼
        ┌──────────┐
        │   END    │
        └──────────┘
```

FIG. 13

101	107

INPUT EQUIPMENT PROFILE DATA

OUTPUT EQUIPMENT PROFILE DATA

INPUT EQUIPMENT

DATA CONVERSION UNIT `106`

DATA CONVERSION UNIT `112`

OUTPUT EQUIPMENT

DEVICE INDEPENDENT SIGNAL
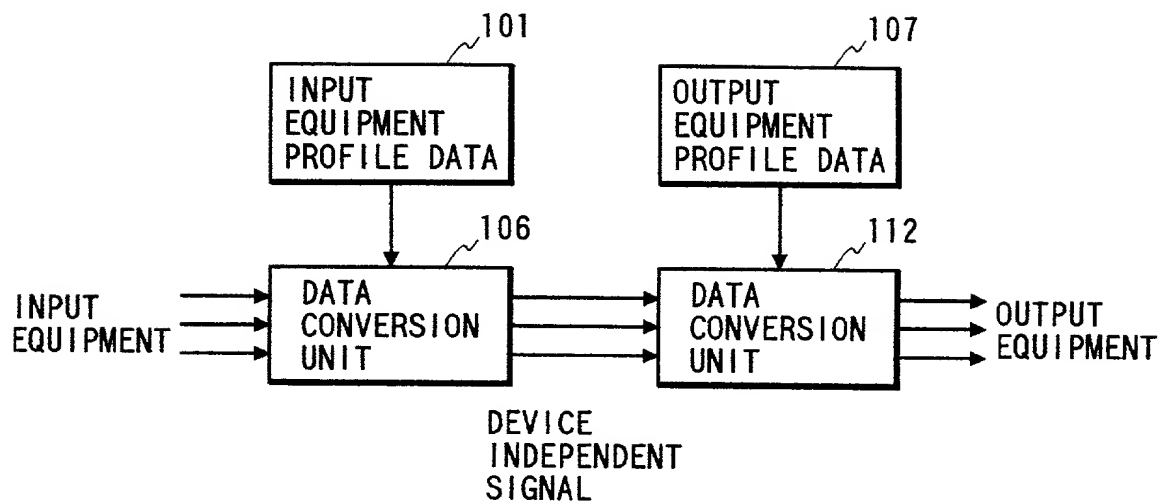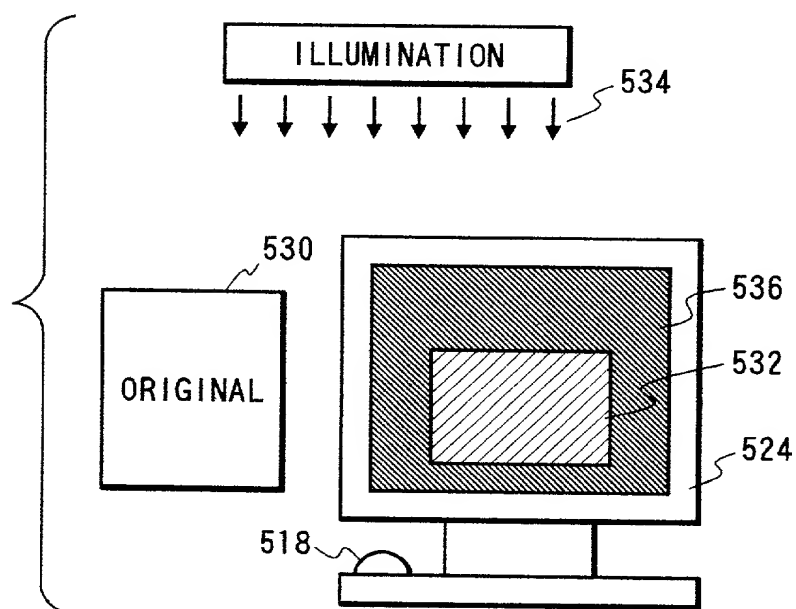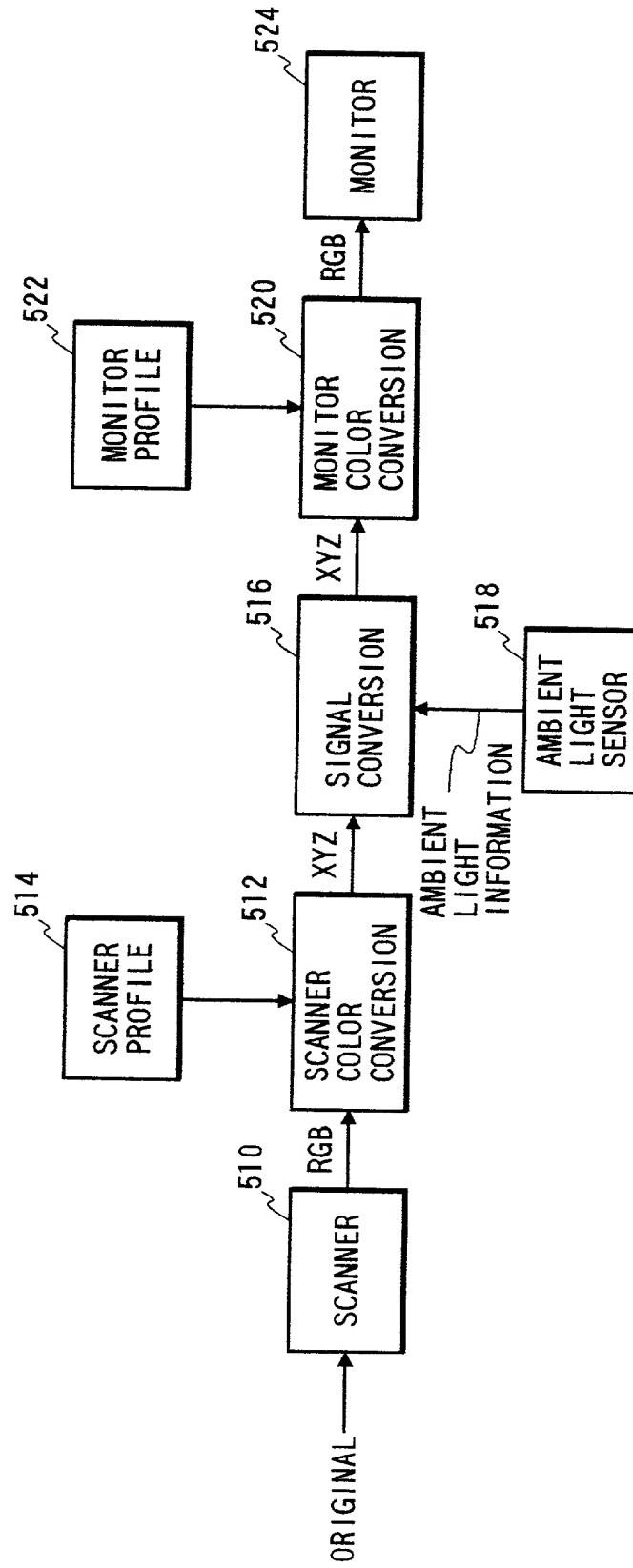
FIG. 15

ILLUMINATION `534`

ORIGINAL `530`

`536`

`532`

`524`

`518`

FIG. 14

COMBINED DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled __IMAGE PROCESSING APPARATUS AND__ __METHOD_____, the specification of which

☐ is attached hereto. ☒ was filed on __October 1, 1996_____ as Application No. __08/724,481__

and was amended _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Country	Application No.	Filed (Day/Mo./Yr.)	Priority Claimed (Yes/No)
Japan	7-255140	2 October 1995	Yes
Japan	7-343849	28 December 1995	Yes

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COMBINED DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION
(Page 2)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Fifth Inventor's signature _____

Date _____ Citizen/Subject of _____

Residence _____

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